

Effects of Pemetrexed and Docetaxel Combined with Cisplatin in the Treatment of Non-small Cell Lung Cancer

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Abstract: The purpose of this study was to compare the clinical effects of pemetrexed and docetaxel combined with cisplatin in the treatment of patients with non-small cell lung cancer. A total of 58 patients with non-small cell lung cancer who were enrolled between January 2017 and January 2018 were enlisted into a randomized digital table. 29 patients who have received treatment with combined pemetrexed and cisplatin were assigned to the pemetrexed group, whereas for the other 29 patients which were treated with docetaxel and cisplatin combined, were assigned to the docetaxel group to verify the calculated clinical treatment efficiency of the patients with non-small cell lung cancer, soluble vascular cell adhesion molecule 1 (SVCAM-1), and activated leukocyte cell adhesion molecule-1 (aLCAM-1) concentrations and to evaluate the quality of life scores of the patients after half a year as well as the incidences of adverse reactions following the treatments provided. The differences in SVCAM-1 and aLCAM-1 concentrations and incidence of adverse reactions in patients with non-small cell lung cancer in the docetaxel group as compared with patients in the pemetrexed group after the treatments were statistically significant ($P < 0.05$) where the calculations were performed with data sets gathered from and between the two groups. In addition, SVCAM-1 and aLCAM-1 concentrations in patients in both pemetrexed group and docetaxel group demonstrated significant differences in concentrations before and after the treatments were provided, $P < 0.05$. The comparative studies of the effects of the treatments on the quality of life scores and clinical treatment efficiency between the two groups after half a year, $P > 0.05$, demonstrated no analytical significance. Both pemetrexed combined with cisplatin

and docetaxel in combination with cisplatin as forms of treatments demonstrated significant effects in patients with non-small cell lung cancer. However, based on our study, it was found that the combined treatment involving pemetrexed and cisplatin can further reduce adverse reactions and thus is worthy of clinical application.

Keywords: *pemetrexed; docetaxel; cisplatin; non-small cell lung cancer*

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0 Introduction

The clinical efficacy of pemetrexed and docetaxel combined with cisplatin as a form of treatment for 58 patients with non-small cell lung cancer who were enrolled between January 2017 and January 2018 was reported.

1 Materials and methods

1.1 Basic information

This group study included 58 patients with non-small cell lung cancer who were enrolled between January 2017 and January 2018. The study was carried out based on a random number table where patients were assigned randomly either to pemetrexed or docetaxel groups. Based on the table, the pemetrexed group consisted of 29 patients with the ratio of male-to-female patients at 15:14, while the age range of the group was between 30 and 70 years old with the median value of

50.21 ± 4.21 years old. The docetaxel group consisted of another 29 patients with the ratio of male-to-female patients at 16:13, and the age range was between 31 and 71 years old with the median value of 50.54 ± 4.54 years old. The basic information of patients with non-small cell lung cancer in pemetrexed and docetaxel groups was statistically compared, $P > 0.05$, and was found that no analytical significance existed.

1.1.1 Inclusion criteria

All enrolled patients were confirmed by cytological examination or histopathological examination, that is, patients with initial treatment of distant metastasis or locally advanced adenocarcinoma, with an estimated survival period of >3 months, and the body state score (KPS) exceeding 70 points, patients and their respective families, after understanding about this chemotherapy program, provided their written informed consent in agreement to undergo the treatments presented in this study.

1.1.2 Exclusion criteria

Patients with abnormal liver and kidney function, patients with chemotherapy contraindications were excluded from the study.

1.2 Methods

Patients in the docetaxel group were treated with docetaxel combined with cisplatin. The patients were given 8 mg of dexamethasone daily for 1 day before chemotherapy for 3 consecutive days. On the 1st day after chemotherapy, the patient was intravenously infused with 75 mg/m² of docetaxel and the injection was completed within 1 h. In addition, on the day, patients were also given intravenous infusion of 25 mg/m² cisplatin. Separately, for the pemetrexed group, patients were given 1000 µg Vitamin B₁₂ every 7 days before chemotherapy. In addition to that, a daily oral administration of 1000 µg folic acid and a daily oral administration of 8 mg dexamethasone for 3 days before chemotherapy continuously carried out. On the 1st day after chemotherapy, intravenous infusion of 500 mg/m² pemetrexed was performed in patients from this group and injection was completed within 1 h. Thereafter, the patients were additionally given an intravenous infusion of 25 mg/m² cisplatin on the same day.

1.3 Observation indicators

Statistical calculation of clinical treatment efficiency of patients with non-small cell lung cancer in

pemetrexed group and docetaxel group was performed to include clinical treatment efficiency, measurement of soluble vascular cell adhesion molecule 1 (SVCAM-1), and activated leukocyte cell adhesion molecule-1 (alCAM-1) concentrations, quality of life scores of the patients after half a year, and adverse reaction rate. After the treatments, a patient who has gained >2 kg and has completely cleared of the lung tumor lesions with the said condition being able to sustain for >1 month was indicated as complete response. For a patient who has a weight gain between 1 and 2 kg and has a reduction of the lung tumour lesions by >50% where the condition was able to be sustained for >1 month, was indicated as partial response. For a patient whose weight change was not significant after the treatments and the degree of lung tumour lesion reduction was seen to be between 25% and 50% was indicated as stable disease. While for a patient who has developed new lesions after the treatments or the degree of lung tumour lesion was seen to have decreased at <25% was indicated a disease progression.

SVCAM-1 and alCAM-1 (soluble intercellular adhesion factor 1) were both detected by ELISA method using a Clinibio microplate reader. The measurement of efficiency is the sum of partial mitigation and effective mitigation.

1.4 Statistical methods

The data involved in this analysis were analyzed using the Statistical Package for the Social Sciences 19.0 software. The Chi-square test was used to analyze the count data, which was expressed in the form of rate (%). The measurement data were analyzed by *t*-test and expressed in the form of (mean ± standard deviation), $P < 0.05$. Statistics calculations were performed with data sets gathered from and between the two groups.

2 Results

2.1 Statistical analysis on the clinical treatment efficiency of the two groups of patients with non-small cell lung cancer.

The calculated clinical treatment efficiency of patients with non-small cell lung cancer from the docetaxel group was 37.93% as compared with 31.03% from the pemetrexed group, $P > 0.05$. The statistics calculated did not show any significance between the groups [Table 1].

Table 1. Comparison and analysis of the calculated values of clinical treatment efficiency in two groups of patients with non-small cell lung cancer

Group	Number of cases	Disease progression	Stable disease	Partial response	Complete response	Calculated value of clinical treatment efficiency
Docetaxel	29	6	12	7	4	37.93%
Pemetrexed	29	7	13	6	3	31.03%
X ²						0.3053
P						0.5806

Table 2. Comparative study of quality of life scores of the two groups of patients with non-small cell lung cancer after half a year

Group	Number of cases	Material lifestyle	Social function	Psychological function	Physical function
Docetaxel	29	85.55±5.31	84.54±4.54	86.54±3.98	85.54±5.84
Pemetrexed	29	84.57±4.54	85.21±5.01	87.98±4.69	84.87±4.65
t		0.7554	0.5336	1.2606	0.4833
P		0.4532	0.5957	0.2127	0.6308

Table 3. Comparative study on the incidence of adverse reactions in the two groups of patients with non-small cell lung cancer

Group	Number of cases	Leukocyte decrease	Nausea	Thrombocytopenia	Anemia	Abnormal liver function	Adverse reaction rate
Pemetrexed group	29	1	1	1	1	1	17.24%
Docetaxel group	29	2	4	3	2	2	44.82%
X ²							5.1556
P							0.231

2.2 Statistics analysis on the quality of life scores of the two groups of patients with non-small cell lung cancer after half a year

The quality of life scores of the patients with non-small cell lung cancer in the docetaxel group and the pemetrexed group was compared, $P > 0.05$. The statistics calculated did not show any significance between the groups [Table 2].

2.3 Statistics analysis on the incidence of adverse reactions in two groups of patients with non-small cell lung cancer

The incidence of adverse reactions in patients with non-small cell lung cancer from the docetaxel group was 44.82% compared with 17.24% from the pemetrexed group, $P < 0.05$. The calculation performed between the two groups was found to be statistically significant [Table 3].

2.4 Statistics analysis on the concentration of SVCAM-1 and aICAM-1 in the two groups of non-small cell lung cancer patients

The calculated results showed that before treatments were provided, the initial concentrations of SVCAM-1

and aICAM-1 present in patients with non-small cell lung cancer from the docetaxel group were statistically insignificant when compared with patients from the pemetrexed group, $P > 0.05$, indicating no difference between the two groups. After the treatments were performed, statistical results calculated on the concentrations of SVCAM-1 and aICAM-1 present in patients with non-small cell lung cancer of the docetaxel and pemetrexed groups demonstrated statistical significance, $P < 0.05$, indicating significant reductions in both SVCAM-1 and aICAM-1 concentrations after the treatments were provided in their respective groups. In addition, a comparison of SVCAM-1 and aICAM-1 concentrations before and after treatments in patients with non-small cell lung cancer from between the pemetrexed and docetaxel groups was also shown to be statistically significant, $P > 0.05$ [Table 4].

3 Discussion

Non-small cell lung cancer is a common and frequently malignant tumor disease with a relatively high prevalence and mortality, accounting for approximately 80% of lung tumors^[1,2]. Diagnosis of the non-small cell lung cancer disease at early stages

Table 4. Comparative study of SVCAM-1 and aICAM-1 concentrations in two groups of patients with non-small cell lung cancer

Group type	Number of cases	SVCAM-1	aICAM-1
Docetaxel	29		
Before treatment		888.54±11.24	522.54±10.20
After treatment		800.54±10.26 ^{ab}	489.54±5.31 ^{ab}
Pemetrexed	29		
Before treatment		886.87±22.31	521.87±11.54
After treatment		422.21±11.54 ^b	328.54±5.69 ^b

^aPemetrexed group reference $P < 0.05$, ^band pre-treatment reference $P < 0.05$. SVCAM-1: Soluble vascular cell adhesion molecule 1, aICAM-1: Activated leukocyte cell adhesion molecule-1

is not easy, with most cases of the disease, diagnosis took place only at the advanced stages, leading to the loss of the best surgical opportunity and long-term chemotherapy treatment which play important roles in the success of treating the disease. Docetaxel belongs to a derivative of paclitaxel semi-synthesis, also known as docetaxel. Compared with paclitaxel, the clinical antitumor spectrum is relatively broad^[3,4]; pemetrexed is a kind of antifolate preparation, based on the destruction of acid-dependent normal metabolism in cells that inhibit cell replication and thus act to effectively inhibit the growth and development of cancer cells^[5,6]; cisplatin is a heavy metal complex produced by combining two ammonia molecules, two chlorine atoms, and divalent platinum. It is similar to a bifunctional alkylating agent and has strong advantages and broad anticancer spectrum^[7-10]. The data obtained showed that the incidence of SVCAM-1, aICAM-1, and adverse reactions in patients with non-small cell lung cancer in the docetaxel group was compared with that in the pemetrexed group, $P < 0.05$, and the statistical significance of the data was verified.

Taken altogether, it was revealed that the combination of pemetrexed and cisplatin as a form of treatment for patients with non-small cell lung cancer is more prominent compared to the combined treatment of docetaxel and cisplatin.

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